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NEW AND OLD PROOFS OF THE PYTHAGOREAN THEOREM.

By BENJAMIN F. YANNEY, A. M., Mount Union College, Alliance, Ohio, and JAMES A. CALDERHEAD, B. Sc.,
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[Continued from March Number.]

The following "dissection proofs" differ from the preceding ones only in the fact that there is a displacement of one or more of the squares from their usual places.

LXXXIII. Fig. 34.

Let the $\triangle ABC$ be right-angled at C .

$\triangle LHK = \triangle ABC$, and $\triangle LAE = \triangle HBF$.

$\therefore ABHL \approx ACDE + DFHK$.

Q. E. D.

LXXXIV. Fig. 34.

$LMOA \approx LKCA \approx ACDE$.

$HMOB \approx HKCB \approx HKDF$.

$\therefore ABHL \approx ACDE + DFHK$.

Q. E. D.

LXXXV. Fig. 34.

$ANQB \approx AEFB \approx AEDC$.

$LNQH \approx LEFH \approx FHKD$.

$\therefore ABHL \approx ACDE + DFHK$.

Q. E. D.

NOTE. In Fig. 34, if $\triangle ALE$ is taken as the triangle, we have another type of figure, thus giving several more proofs. See Halsted's *Elements of Geometry*, page 78.

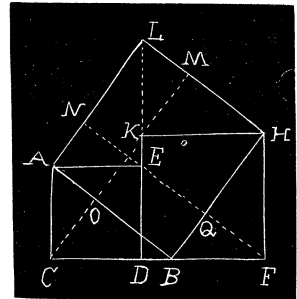


Fig. 34.

LXXXVI. Fig. 35.

The given triangle is ABC .

$\triangle LNO = \triangle APE'$. $\triangle LMO = \triangle ABC$.

$\triangle AHM = \triangle MDA \approx PADE + BNK$.

$\therefore AMLB \approx ADEE' + AHKC$. Q. E. D.

LXXXVII. Fig. 35.

$LRSB \approx LOCB \approx ADEE'$.

$AMRS \approx AMOC \approx AHKC$.

$\therefore AMLB \approx ADEE' + AHKC$. Q. E. D.

LXXXVIII. Fig. 35.

$ABTX \approx ABVD \approx ADEE'$.

$MLTX \approx MLVD \approx AHKC$.

$\therefore AMLB \approx ADEE' + AHKC$. Q. E. D.

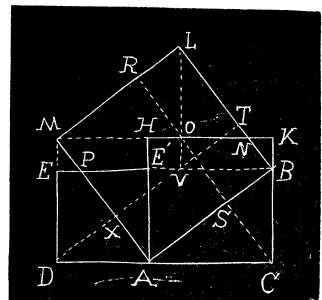


Fig. 35.

NOTE. In Fig. 35, if $\triangle AMH$, $\triangle MLO$, or $\triangle LBV$ is taken as the given triangle, we have slightly different types of figures, each yielding various proofs.

LXXXIX. Fig. 36.

$AOC = APE$. $MNB = HFB$.

$MNOL = HKPB$.

$\therefore ABML \cong ACDE + DFHK$. Q. E. D.

XC. Fig. 37.

$PBR = SBK$. $RPLO = ETAD$.

$LNO = ATF$. $NMAC = SBAH$.

$\therefore ABLM \cong ADEF + AHKC$. Q. E. D.

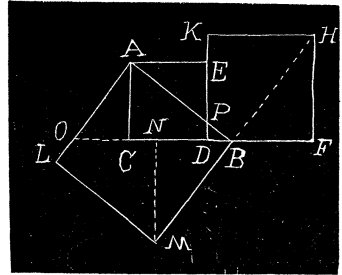


Fig. 36.

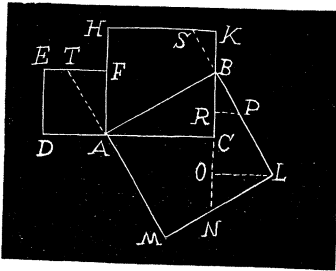


Fig. 37.

It will be observed that the above proofs differ chiefly in the relative position of the triangle and the squares. In order to give an idea of still other possible varieties, it may be noted for example, that instead of the arrangement as we have it in Fig. 35, the given triangle may have seven other positions within the square $ACKH$, right angles coinciding. Furthermore, in each case, the square on the hypotenuse may be constructed outwardly from the triangle, or overlapping it. One of these cases, it will be remembered, was considered in November number, 1897.

[To be continued.]

DEPARTMENTS.

SOLUTIONS OF PROBLEMS.

ARITHMETIC.

104. Proposed by ALOIS F. KOVARIK, Instructor in Mathematics and Physics, Decorah Institute, Decorah, Iowa.

If I should buy goods at a price 20% higher than I did buy them, and sell the goods for the same amount that I did sell them, I would gain 25% less than I did gain. What per cent. did I gain? (Solve by Arithmetic).

I. Solution by W. F. DRADBURY, Head Master, Cambridge Latin School, Cambridge, Mass.

If I gain 25% less, I get $\frac{3}{4} \times \frac{25}{100}$, or $\frac{3}{16}$ of \$1 less than if I sold at the same per cent. advance. If I sell at same per cent. advance, I should receive $\frac{3}{4}(1 + \frac{r}{100}) = \frac{3}{4} + \frac{6r}{500}$. What I did receive was $1 + \frac{r}{100}$. Subtract, and we have